

**BALASORE SCHOOL OF**  
**ENGINEERING**  
**ESTIMATING-1**  
**THEORY-04**  
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**SEMESTER-3RD**

## CHAPTER – 1

**1.Q. What are the units of dimension of the following materials and works? [2015 (s) 1-a]**

- (i) Glass panes
- (ii) Stone blocks
- (iii) Reinforcement
- (iv) Formwork

**Ans:** Glass Panes: Length and breadth in cm or m, thickness in mm.  
 Stone Blocks: All dimensions are in cm.  
 Reinforcement: Quintal  
 Formwork : Sqm.

**2.Q. What is the nominal size of the standard modular brick and traditional brick ? [2015(s)1-b]**

**Ans:** Size of standard brick – 20 cm × 20 cm × 10 cm × 10 cm  
 Size of traditional brick = 22.9 cm × 11.4 cm × 7.6cm

**3.Q. In a room of size 5.0 m × 3.0m with wall thickness 300 mm, calculate the length of Long wall and short wall for construction of main wall. [2014(s) 1-e]**

**Ans:** Size of the room = 5.0 m × 3.0 m  
 Wall thickness = 300 mm.  
 Length of long wall centre to centre

$$= 5.0 + \frac{0.3}{2} + \frac{0.3}{2} = 5.30\text{m}$$

The length of short wall centre to centre

$$= 3 - \frac{.3}{2} - \frac{.3}{2} = 2.7\text{m}$$

**4.Q. Explain the "Unit Rate Estimate". [2014(s)1-a]**

**Ans:** Unit rate Estimate : The rates per unit of various items of work, the rates of various materials the rates of different labour like skilled, unskilled as masonry carpenter, coolie should be available for prepared estimate.

**5.Q. List out the enclosures/attachments to be submitted with an estimate. [2014(s) 1-b]**

- Ans:**
- (i) Detailed measurement.
  - (ii) Rat analysis for material and labour.
  - (iii) Labour rate chart
  - (iv) Proposed drawing including plan, elevation and section.
  - (v) Approximate duration period.

**6.Q. Write down the units of measurement for the following items :**

- (i) Cement
- (ii) Reinforcement
- (iii) Brick on edge
- (iv) Wood works in door and windows shutter. [2014(s) 1-e]

**Ans:** Cement → bag(50kg)

Reinforcement → quintal  
 Brick on edge → meter  
 Wood works indoor and windows shutter → sq.m

**7.Q. Explain the term A.R. (Estimate) [2015(s), 1-f]**

**Ans:** A.R estimate (Annual repair estimate) after completion of a work it is necessary to maintain the same for its proper function and for the same, an estimate is prepared for the items which are require renewal, replacement, repair etc., in the form of a detail estimate.

**8.Q. Plinth area and carpet area of building [2016(s) 4-d]**

**Ans:** Plinth Area is the built up covered area measured at the floor level of the basement or of any storey of a building.

→ Plinth area can be calculated by taking the external dimension of building excluding plinth offset.

Carpet area : The carpet is the floor area less the area of following portion.

→ Verandah, corridor, entrance hall, staircase, bathroom, kitchen etc.

**9.Q. Multiplying factor for painting work in case of M.S. grills and fully paneled window. (2017w 1-a)**

**Ans:** The multiplying factor for m.s. grill is 1 for each side and for penalled window is 1.30 of each side.

**10.Q. Prepare for details of "measurement form" and "abstract or estimate form". [2016 s 1-a]**

**Ans: Details of measurement form:**

Item No.	particular of items & details of works	No.	Length m	Breath m	Height of depth m	Quantit y	Explan atory Notes
1.							
2.							
3.							

**Abstract of Estimate form:**

Item No.	Particulars of items of works	Quan tity	Unit	Rate Rs P	per	Amount Rs. P.

**MED**

**1.Q. Differentiate between Revised Estimate and Supplementary Estimate.[2018 s 5 b]**

**Ans: Revised Estimate:-**

- (i) This is required when the sanctioned amount is exceeded due to change of rates or addition of works fairly dependent on the work at first

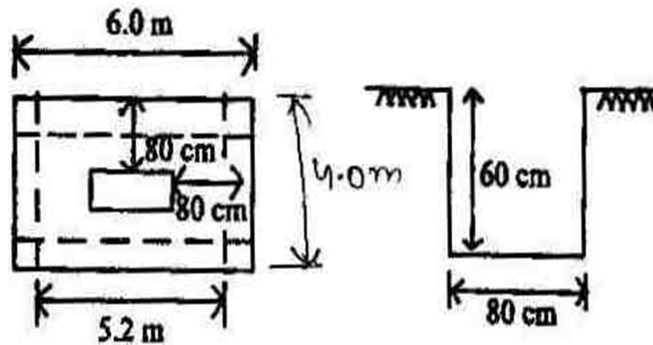
sanctioned, so a revised estimate is due to material deviation from the original proposal.

- (ii) It is accompanied with a comparative statement abstract from showing the probable variations for quantity, rate and amount against each item of work involved in the project.
- (iii) Revised estimate is required due to change of rate or quantity of materials, so no additions or revisions of drawings is necessary.

#### Supplementary Estimate:-

- (i) This is required due to supplementary works which are fairly independent of the work at first sanctioned. So supplementary estimate is due to material deviation of a structural nature from the design originally approved.
- (ii) No comparative abstract form is required. This is an estimate for additional works only. The abstract shows the original estimate and the total amount of the sanction required including supplementary amount.
- (iii) Supplementary estimate is required due to some new works or due to change of design, so additions or revisions of drawing may be necessary.

**2.Q. Calculate the volume of the earthwork of the following fig.[2014 1 c]**



$$\begin{aligned} \text{Centre to centre length of long wall} &= 6 - 2 \times .8/2 = 5.2 \text{ m.} \\ \text{Centre to central length of short wall.} &= 4 - .8/2 \times 2 = 3.2 \text{ m} \\ \text{Total centre to centre length.} &= (5.2 \times 2) + (3.2 \times 2) = 10.4 + 6.4 = 16.8 \text{ m} \\ \text{Earth work in excavation} &= L \times b \times h \\ &= 16.8 \times .8 \times 6 = 8.064 \text{ m}^3 \end{aligned}$$

**3.Q. What is the difference between "Approximate Estimate" and "Detailed Estimate" ? [2014w 5 b ]**

**Ans: Approximate Estimate:-**

Preliminary or approximate or abstract estimate is required for preliminary studies of various aspects of a work for project, to decide the financial position and policy for administrative section by the competent

administrative authority. In case of commercial projects as irrigation projects, residential building project and similar projects which earn revenue income, the probable income may be worked out, and from the preliminary estimate the approximate cost may be known and then it may be seen whether the investment, on the project is justified or not. For non-commercial projects or for projects giving no direct return, their necessity, utility, availability of money etc., may be considered before final decision is taken.

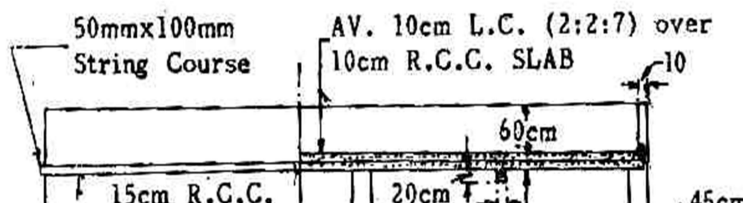
**Detailed Estimate : -**

Detailed estimate is an accurate estimate and consists of working out the quantities of each item of works and working the cost. The dimensions length, breadth and height of each item are taken out correctly from drawing and quantities of each item are calculated, and abstracting and billing are done.

## CHAPTER:2

**Q. Estimate the quantities of the following items of work of the building.**

- i. Earthwork in excavation in foundation
- ii. Cement concrete in foundation (1: 4: 8)
- iii. First class brickwork (1:4) in foundation and plinth
- iv. 25 mm thick D.P.C. with I.C (1 : 2 : 4)
- v. 1<sup>st</sup> class brick work (1 : 6) in super structure [2016w, 1]



Schedule

**Solved by Centre line Method:**

**Ans:** Calculation of centre line for main outer wall.  
 $= 2[(4.5 + .30 + 4 + 2 \times .30/2) + (3.6 + 2 \times .30/2)] = 26.00 \text{ m}$   
Partition wall =  $(3.6 + 30) = 3.90 \text{ m}$   
Total = 29.90 m

Note that the number of joints is two for Verandah wall.

Front =  $(4.5 + .30 + 4 + 2 \times .30) - 2 \times .20/2 = 9.20$

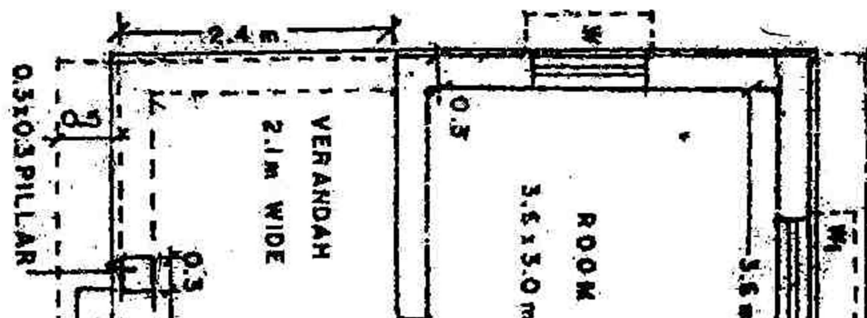
$$= 2 (1.60 + .30/2 + .20/2) = 3.70$$

$$\text{Total} = 12.90$$

Numbers of joints are two with main wall.

Item No.	Description of item	No	Length (m)	Breath (m)	Height (m)	Quantity	Explanatory Notes
1	Earth work in excavation:- Main walls	1	29.00	0.90	0.90	23.49	29.00= (29.90-2×.90/2)
	Verandah walls	1	12.00	0.70	0.90	7.56	12.00= (12.90-2×.90/2)
	Steps	1	2.60	0.80	0.15	0.30	0.80= 91.0+1/2 ×.30)-.70/2
				Total		31.05cum	
2.	Cement concrete in foundation :- (1:4:8)					31.36cum	
	Main walls	1	29.00	.90	.30	7.83	
	Verandah walls	1	12.00	.70	.30	2.52	
	Steps	1	2.60	1.00	.15	0.39	
						10.74cum	

Item No.	Description of item	No	Length (m)	Breath (m)	Height (m)	Quantity	Explanatory Notes
3	1 <sup>st</sup> class brick work in foundation Main wall and plinth						29.30
	1 <sup>st</sup> footing	1	29.30	0.60	0.20	3.52	=29.90-2×.60/2
	2 <sup>nd</sup> footing	1	29.40	0.50	0.20	2.99	29.40 =29.90-2×50/2
	Plinth wall	1	29.50	0.40	0.80	9.44	
	Verandah walls 1 <sup>st</sup> footing Plinth wall lower	1	12.30	0.40	0.20	0.98	12.30 =12.90-2×.60/2 12.40



SCHEDULE : Door

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**2.Q.** Estimate the quantities of the following items of work of the building.

- A. Earth work in excavation of foundation French in hard soil
- B. 1<sup>st</sup> class K.B. brick work in cement mortar (1:6) for foundation and plinth.
- c. 40 mm thick D.P.C. with c.c. (1: 2 : 4)
- D. RCC work for lintels and chajjas with (1 : 2 : 4) over doors, windows and verandah opening.

E. 12 mm thick cement plaster (1 : 6) to inside brick. (2016 w 1 )

Ans: For Room

Centre to centre length of long wall  
 $= 3.6 \times 3.6 + 3 + .3/2 \times 2 = 7.8 \text{ m (2nos.)}$

Centre to centre length of short wall  
 $= 3.0 + .3/2 \times 2 = 3.3 \text{ m (3 nos)}$

For Kitchen :

C. to C. length of long wall =  $3.6 + .3 = 3.9 \text{ m (1 nos.)}$

C. to C. length of short wall =  $2.1 + .3 = 2.4 \text{ m (2 nos)}$

Total C. to C. length of main wall  
 $= (7.8 \times 2) + (3.3 \times 3) + (3.9 \times 1) + (2.4 \times 2)$   
 $= 15.6 + 9.9 + 3.9 + 4.8$   
 $= 34.2 \text{ m}$

For Verandah

C. to C. Length of ver. Long wall  
 $= 3.6 + .3/2 \times 2 = 3.9 \text{ (1 nos)}$

C. to C. length of ver. Short wall  
 $= 2.1 + .3/2 \times 2 = 2.4 \text{ m}$

Total C. to C. length of verandah  
 $= 3.9 + 2.4 = 6.3 \text{ m}$

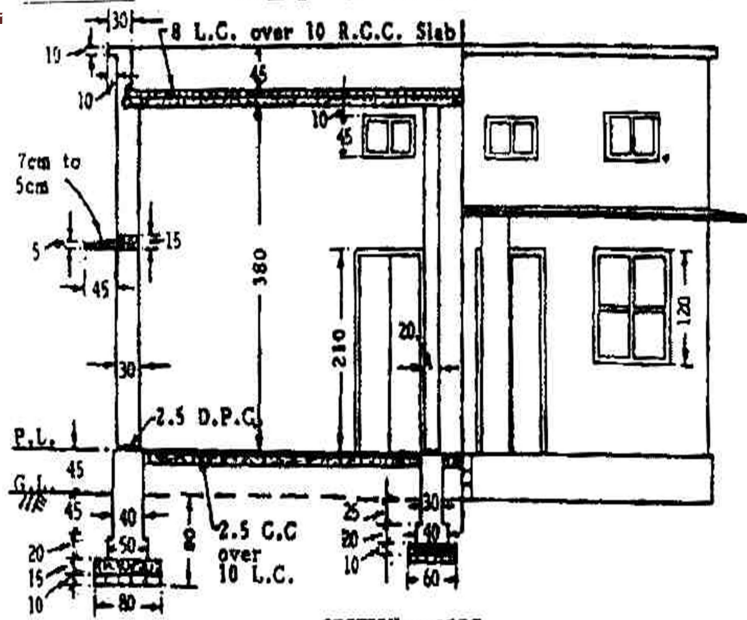
Sl. No	Description of item	No	L (m)	B (m)	H (m)	Quantity	Explanatory Notes
1	Earthwork in excavation of foundation French in hard soil						
	For main wall	1	32.6	0.8	.6	15.648m <sup>3</sup>	.3+.2+.1=.6
	For Verandah	1	5.5	0.8	.6	2.64 m <sup>3</sup>	34.2-8/2×4=32.6

Sl. No	Description of item	No	L (m)	B (m)	H (m)	Quantity	Explanatory Notes
5	Room – 1	1	13.2	-	3.5	46.2 m <sup>2</sup>	
	Room – 2	1	13.2	-	3.5	46.2 m <sup>2</sup>	
	Kitchen	1	11.4	-	3.5	39.9 m <sup>2</sup>	$(3.6+2.1) \times 2 = 11.4$
	Verandah Room	1	6	-	3.5	21 m <sup>2</sup>	$3 \times 2 = 6$

3.Q

Prepare a detailed estimate of a building from the given plan and cross section as shown in figure.

- a. Earthwork excavation for foundation in hard soil [6]
- b. 1<sup>st</sup> class brickwork in (1:4) in foundation and plinth [10]
- c. 2.5 cm thick D.P.C. of cement concrete in (1: 3 : 6) [4]
- d. 1<sup>st</sup> class brickwork in 1 : 6 in super structure [10]
- e. 12 mm thick cement plaster inside building [10] (2015w 1)



SECTION - ABDC

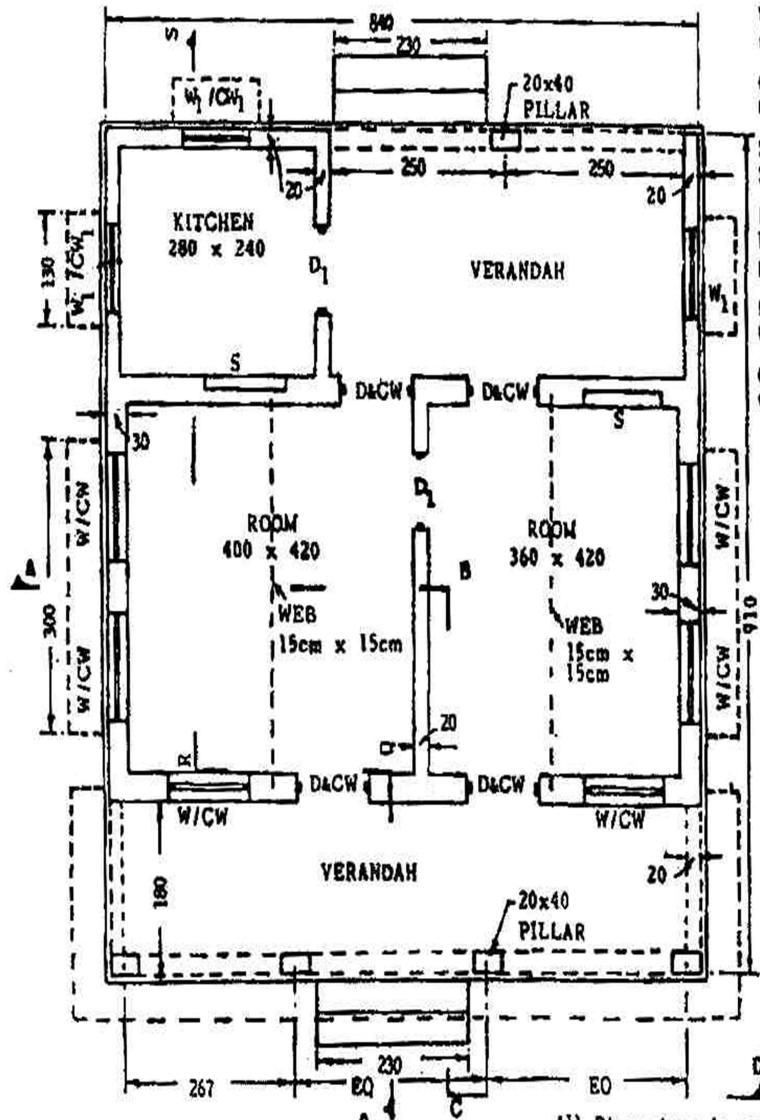
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Schedule

- DOORS :
- D = 100x210
- D<sub>1</sub> = 90x210
- WINDOWS :
- W = 110x120
- W<sub>1</sub> = 90x120
- CW = 75x45
- CW<sub>1</sub> = 60x45

SHELF :

- S = 110x140
- FRAME :
- D = 8x10
- D<sub>1</sub> = 8x10
- W = 8x10
- W<sub>1</sub> = 8x10
- CW = 6x5
- CW<sub>1</sub> = 6x5



PLAN

All Dimensions in cms.

centre line method :

$$\text{outer walls of rooms} = 2[(4 + .20 + 3.6 + .30) + (4.2 + 3.0)] = 25.20 \text{ m}$$

20 cm walls

$$\text{Partition of rooms} = 4.2 + .30 = 4.5 \text{ m}$$

Front and back of building

$$2[(2.8 + .20 + 2 \times 2.5) + 2 \times .20/2] = 16.40 \text{ m}$$

Front verandah sides

$$= 2(1.8 - (.20)/2 + (.30)/2) = 3.70 \text{ m}$$

Back verandah sides and walls and kitchen

$$\text{Front} = 3(2.4 + (.30)/2 + (.20)/2) = 7.95 \text{ m}$$

$$\text{Total length} = 4.50 + 16.40 + 3.70 + 7.95 = 32.55 \text{ M}$$

Number of Joints 7 nos with main wall and 1 no. with 20 cm wall.

Excluding partition wall total length of centre line

$$= 32.55 - 4.50 = 28.05 \text{ m}$$

Number of joints 5 nos with main wall and 1 no. with 20 cm wall.

Sl. No	Description of item	No	Leng. (m)	Breat h (m)	Heig. (m)	Quantity	Explanatory Notes
1	Earthwork in excavation of foundation French outer walls of room	1	25.2	.80	.90	18.14	$29.45 = 32.55 - 7 \times .8/2 - .6/2 \times .55 = 2 \times .3 + .10 + .3/2 - .3$
	20 cm walls	1	29.45	.60	.65	11.49	
	Steps, front and back	1	2.50	.55	.10	29.63 28	
2.	1 <sup>st</sup> class brick work in (1 : 4) in foundation and plinth outer wall of rooms						$30.95 = 32.55 - 7 \times .4/2 - .4/2$ $31.00 = 32.55 - 7 \times .4/2 - .3/2$
	1 <sup>st</sup> footing 50 cm	1	25.20	.50	0.20	2.52	
	2 <sup>nd</sup> footing 40 cm Verandah and 20 cm walls	1	25.20	.40	0.90	9.07	
	1 <sup>st</sup> footing 40 cm	1	30.95	.40	0.20	2.48	
	2 <sup>nd</sup> footing 30 cm	1	31.00	.30	0.70	6.51 20.58	
	Step front and back	2	2.30	.45	.30	.62	
						21.20 m <sup>3</sup>	
3.	2.5 cm thick D.P.C. of cement concrete (1:2:4) mail wall	1	25.20	0.30	-	7.56	$31.40 = 32.55 - 7 \times .3/2 - .2/2$
	Verandah and 20cm walls	1	31.40	0.20	-	6.28	
						13.84	
	Deduction for door sills D	4	1.00	.30	-	1.20(-ve)	
	Door sills D <sub>1</sub>	2	.90	.20	-	.36 (-ve)	
	Back verandah opening	2	2.30	.20	-	.92 (-ve)	
						11.36 m <sup>2</sup>	

Sl. No	Description of item	No	L (m)	B (m)	H (m)	Quantity	Explanatory Notes
4.	1 <sup>st</sup> class brick work in 1: 6 in super structure						
(a)	Outer walls of rooms	1	25.20	0.30	3.80	28.73	
	Partition wall	1	4.20	.20	3.80	3.19	
	Verandah and kitchen wall	1	27.20	0.20	3.00	16.32	
(b)	Parpet wall by any method back and front out to out	2	8.40	.20	.63	2.12	4.40= 4.20+2×0.10
	Side inner to inner	2	4.40	0.20	.63	1.11	
	Projections:- Back and front out to out	2	8.60	0.10	.10	0.17	
	Side into in	2	4.80	.10	.10	.10	
						51.74 M <sup>3</sup>	
	Deduction for door opening D with lintel	4	1.00	.30	2.25	2.70	2.25=2.10 +.15 (for lintel
	Door opening D <sub>1</sub> with lintel	2	.90	.20	2.25	0.31	
	Window W	4	1.10	.30	1.35	1.78	
	W (comb)	2	2.70	.30	1.35	2.18	
	W <sub>1</sub>	3	.90	.20	1.35	1.09	
	CW	10	.75	.30	.55	1.24	
	CW <sub>1</sub>	2	.60	.20	.35	1.13	
	Self opening S	2	1.10	0.20	1.55	.68	
	Front ver. Opening, front	3	2.27	0.20	2.65	3.61	
	Sides	2	1.60	.20	2.65	1.70	
	Back verandah opening	2	2.30	.20	2.65	2.44	
	Lintel over pillar	1	2.00	.20	.15	.06	
						32.32 m <sup>3</sup>	



Sl. No	Description of item	No	Leng. (m)	Breat (m)	Heig. (m)	Quantity	Explanatory Notes
5.	12 mm thick cement plaster inside						
(i)	Bigger room						
	Bigger room LW	2	4.20	-	3.80	31.92 m <sup>2</sup>	
	Bigger room SW	2	4.20	-	3.80	30.40	
	Bigger room ceiling	1	4.20	4.00	-	16.80	
	Smaller room LW	2	4.20	-	3.80	31.92	
	Smaller room SW	2	3.60	-	3.80	27.36	
	Smaller room ceiling	1	4.20	3.60	-	15.12	
	Web of R.C. beam	2x	4.20	-	.15	2.52	
	Jamb, sills and soffit of shelves	2	5.00	.20	-	2.00	5.00=2(1.1+1.4)
(ii)	Kitchen L.W	2	2.80	-	3.0	16.80	
	Kitchen SW	2	2.40	-	3.0	14.40	
	Ceiling	1	2.80	2.40	-	6.72	
(iii)	Front Verandah front of room	1	8.40	-	3.0	25.20	8.0=8.4-2x.2
	Front above opening	1	8.00	-	0.5	4.00	
	Sides above opening	2	1.60	-	0.5	1.60	0.5=3.0-2.5
	Ceiling	1	8.40	1.80	-	15.70	
iv)	Back verandah Back portion of rooms	1	5.00	-	3.00	15.00	
	Long side above opening	1	5.00	-	.50	2.50	
	Side and kitchen front	2	2.40	-	3.00	14.40	2.6=2.4+2.0
	Ceiling	1	5.00	2.60	-	13.00	.8=.4+2x2.0
(v)	Pillars three sides front pillars	4	.8	-	2.50	8.00	
	Back pillar	1	.8	-	2.50	2.00	
	Deduction opening D	4	1.00	-	2.10	8.40 (-ve)	
	" " " D <sub>1</sub>	2	.90	-	2.10	3.73(-ve)	
	Window opening	2	1.10	-	1.29	2.64(-ve)	
	Window " CW	6	0.75	-	.45	2.02(-ve)	
	Ends of front verandah	2	0.20	-	.50	.20(-ve)	.50=3.0-2.5
	Area of pillar	5	.40	.20		.40(-ve)	
						277.87 m <sup>2</sup>	

## CHAPTER:3

### 1.Q. Define Lump sump [2015(s) 1-c]

**Ans:** Lumpsum in Estimating: sometimes a lumpsum rate is provided for certain small items for which detailed quantities cannot be taken out easily or it takes sufficient time to find the detail as front architectural or decoration work of a building, fire-place, site cleaning and dressing etc.

### 2.Q. What is meant by 'Lead' and 'Life' in estimating ? [2018 w 6 a]

**Ans:** The horizontal distance cover to carry out the excavated earth from the foundation trench towards the heap is known as lead. As per cpwd 1lead =30m.

The vertical distance upto which the earth is excavated from foundation trench is known as lift. As per cpwd 1lift=1.5m.

### 3.Q. Calculate the number of standard bricks required for 12.5 m<sup>3</sup> of brick work. [2014 (s) 1.h]

**Ans:** Number of standard bricks required for 12.5 m<sup>3</sup> of brickwork are :  
 $12.5 \times 500 = 6250$  nos.

### 4.Q. What is meant by "Sundries and Overhead charges" ? [2014(s)1-g]

**Ans:** It is the item of work which cannot be measured but it is required in the work at site. A lumpsum amount is kept as provision to meet sundry expenditure such as during work period anything unhappen thing held.

Overhead Charges: It includes general office expense, rent, tax, then purchase of stationary printing of paper, telephone bill, electric bills and postage etc. This is expense of indirect and not productive.

### 5.Q. How many bags of cement required for 1m<sup>3</sup> cement supply ? 2014(s) 3 (a)

**Ans:** For 10m<sup>3</sup> dry material required 15.2 m<sup>3</sup>

For 1m<sup>3</sup> = 15.2 m<sup>3</sup>

It cement concrete ratio 1 : 2 : 4

$$\text{cement} = \frac{1.52}{1 + 2 + 4} = \frac{0.21\text{m}^3}{0.0347} = 6 \text{ bags}$$

**5MARKS QUS**

**1.Q. Calculate the quantity of dry material for 10 m<sup>3</sup> of cement concrete with proportion (1: 1.5 : 3) [2014(s) 2-a]**

**Ans:** Cement concrete proportion 1 : 1.5 : 3

Summation of proportion  $1 + 1.5 + 3 = 5.5$

Cement  $15.4/5.5 = 2.8 \text{ m}^3$

$= 2.8/0.0347 = 80.69 = 81$  bags

Sand  $= 2.8 \times 1.5 = 4.2 \text{ m}^3$

Aggregate  $= 2.8 \times 3 = 8.4 \text{ m}^3$

**2.Q. Write down the dry material for cement plaster of 100 m<sup>2</sup> in mortar (1: 6) [2014(s) ,2e]**

**Ans:** Dry material for cement plaster of 100 m<sup>2</sup> in mortar (1:6)

If 12 mm thick plastering in wall.

Wet mixed mortar for uniform layer  $= 1.2 \text{ m}^3$

Adding 30 % to fill up joints and uneven surface

$= 1.2 + (1.2 \times 30/100) = 1.56 \text{ m}^3$

Increasing by 25 % total dry volume

$= 1.56 + (1.56 \times 25/100) = 2 \text{ m}^3$

Cement  $2/(1+6) = .30 \text{ m}^3$

Sand  $= 0.3 \times 6 = 1.80 \text{ m}^3$

**3.Q. Calculate the dry material required for 550 m<sup>2</sup> of 25 mm thick D.P.C. cement concrete (1 : 1.5 : 3) [2015(s), 1-e]**

**Ans:** Thickness = 25 mm = 2.5 cm

Summation of proportion  $= 1 + 1.5 + 3 = 5.5$

Cement  $= 15.4/5.5 = 2.8 \text{ m}^3$

Sand  $= 2.8 \times 1.5 = 4.2 \text{ m}^3$

Aggregate  $= 2.8 \times 3 = 8.4 \text{ m}^3$

Volume  $= 550 \times (2.5/100) = 1375 \text{ m}^3$

$$\text{Cement} = 2.8 \times 13.75 = 38.5/.0347 = 1109.5 \text{ bags}$$

$$\text{Sand} = 4.2 \times 13.75 = 57.75$$

$$\text{Aggregate} = 8.4 \times 13.75 = 115.5 \text{ m}^3$$

**4.Q. Calculate dry material required for 1<sup>st</sup> class brick work with brick work with brick size (23 cm × 11 cm × 8 cm) for 5m<sup>3</sup> with 1 : 6 cement mortar. (2015(s) 2-a]**

**Ans:** For 10m<sup>3</sup> brickwork

$$\text{Bricks (22.9 cm} \times 11.4 \text{ cm} \times 7.6 \text{ cm)}$$

$$= 5000 \text{ nos of brick required}$$

$$\text{Dry cement mortar volume } 3.5 \text{ m}^3$$

$$\begin{aligned} \text{Summation of proportion} &= \frac{3.5}{1+6} \\ &= \frac{3.5}{7} \\ &= 0.5 \text{ m}^3 \end{aligned}$$

$$\text{Sand} = .5 \times 6 = 3 \text{ m}^3$$

For 5m<sup>3</sup> brickwork

$$\text{No. of brick required} = 5000/2 = 2500 \text{ nos.}$$

$$\text{No. of bag of cement required} = .5/.0347 = 14 \text{ bags}$$

$$\text{For } 5 \text{ m}^3 \text{ brick work} = 14/2 = 7 \text{ bag.}$$

$$\text{Quantity of sand required for } 5 \text{ m}^3 = 3/2 = 1.5 \text{ m}^3$$

**5.Q. Analyse the rate of laterite stone masonry in 1 : 6 cement mortar by taking cost of labour as per scheduled of rate 2006-07 PWD and following material cost.**

**Cement = Rs. 600/qnt.**

**Sand = Rs. 200/cum**

**Stone chips Rs. 1200/-/cum (2014) 3-b**

**Ans:** For 10m<sup>3</sup> cured Rubble laterite stone masonry. Dry material required store =

$$12.5 \text{ m}^3 \text{ Dry cement mortar} = 4.2 \text{ m}^3 = 18 \text{ bag}$$

$$\text{Cement} = 4.2/1+6 = 4.2/7 = .6 \text{ m}^3/.0347$$

$$\text{Sand} = .6 \times 6 = 3.6 \text{ m}^3$$

$$1 \text{ quintal} = 600/-$$

$$2 \text{ bag} = 600/- \Rightarrow 1 \text{ bag} = 300/-$$

MATERIAL	QUANTITY	RATE	AMOUNT
Particular			
Stone	12.5 m <sup>3</sup>	Rs. 1200/m <sup>3</sup>	Rs. 1500.00
Cement	18 bags	Rs. 300/bag	Rs. 5400.00
Sand	3.6 m <sup>3</sup>	Rs. 200/m <sup>3</sup>	Rs. 720/-
Labour			
Head Mason	½ no.	Rs. 205 per day	Rs. 102.5/-
Mason	13 no.	Rs. 190/-	Rs. 2470/-
Mazdoor & bhisti	20 no.	Rs. 170/-	Rs. 3400/-

Total Rs. 270926/-

½ % contingency and tool and plants

+ 1354.63/-

Rs. 272279.60/-

1 ½ % water charged,

+ 1815.20

Rs. 274094.80/-

10 % profit

+ 27409.48/-

Rs. 301504.28/-

For 1 m<sup>3</sup> work done unit rate Rs. 30150.42/-

**6.Q. List the types of inclined roof generally adopted for building and found out how the members of a king post roof truss and roofing members are calculated, if the pitch of the roof is given ?(2016)3-c**

**Ans:** Following are the inclined roof generally adopted for building:

- Lean to roof
- Couple roof
- Double or purlin roof
- King –post truss roof.
- Combination of king-post and queen-post truss.

Pitch is known : Let  $\theta^\circ$  be the pitch of the roof truss.

(A) For members of a king post roof truss.

- Principle rafter : length = half span  $\times$  sec  $\theta^\circ$
- King post : length = half span  $\times$  tan  $\theta^\circ$

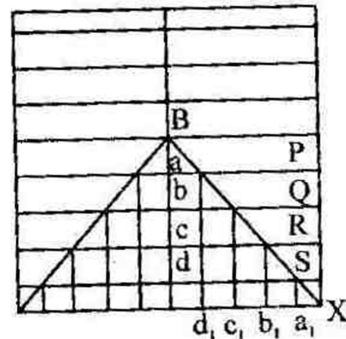
- Tie beam : Clear span + 2 × support
- Struts : Half of the length of principal rafter.

Hence number of common rafters including equivalent.

Length of jack rafter's = Roof length/Spacing

Jack rafter : (Thus for both hipped ends)

Number of rafters = Roof length/Spacing -1



Multiply the result by 2 and add two for the central rafters at the hipped ends.

## CHAPTER:4

### Short qus(2 marks)

**Q.1. How the labourers are classified as per schedule of rate of Govt. of Odisha? [2015(s) 1-d]**

**Ans:** The labours are classified as per the following.

- i. Head mason (mistri) most skilled.
- ii. Mason/semi skilled
- iii. Mazdoor/Non skilled
- iv. Boy or women collie/for helping in the work during execution.
- v. Bhishti/Most unskilled.
- vi. Carpenter/skilled
- vii. Blacksmith/semi skilled
- viii. Painter/skilled

**Q.2. Name different Govt. and public sector organisation employing Civil Diploma holders in Odisha State. [2015(s) 1-f]**

**Ans:** Govt. organisation employing civil diploma in ODISHA state are :

- OPSC, SSC
- Housing Board Organisation
- PWD, Irrigation department, NHPC, R & D department, RWSS etc.

- Public sector organisation employing civil diploma holders in ODISHA state
- Indian Oil
- JINDAL, TATA, ONGC, OPTCL, NALCO.

**Q.3. Duties and responsibility of Junior Engineer [2016(s) 4-b]**

**Ans:** To prepare the necessary drawings, specifications and estimate in accordance with the requirements of the owner.

- To check up the soil conditions.
- Preparation of tender paper.
- To supervise the work and ensure that the drawing and specifications are faithfully followed.
- It is the duty of the Engineer to give necessary instructions to supply working drawing to the contractor.
- To check up the progress of the work with the passage of time and submit progress report to the owner.
- The engineer shall check the quality of work, measurement of workdone, quantities , rates and pass the bill for payment.

**Medium qus(5marks)**

**1.Q. Explain the duties and liabilities of Owner, Engineer and Contractor.(2015)6-c**

**Ans: (i)** The duties and liabilities of the owner and Employer are mainly as follows

- To appoint an Engineer and give him power
- To intimate the Engineer about the requirements of the project including his desired time of complete.
- To obtain necessary sanction for its construction from complement authority in collaboration with the Engineer.
- To give necessary section of the estimated cost to the Engineer.
- To enter into a contract with the contractor by signing the contract documents.
- To give possession of the site to the contractor.

(ii) The duties and liabilities of the Engineer

The contrast imposes heavy responsibilities upon the Engineer. The owner employs a consulting Engineer which may cover the terms, condition and scope of work for design and detailed engineering, project management, and store control, inspection and quality assurance, construction supervision, cost control and

similar items. Secondly the owner may appoint an Engineer to act as a representative of the Owner in order to perform the following duties and responsibilities:

- To prepare the necessary drawings, specifications and estimate in accordance with the requirements of the owner.

(iii) Contractor duties and liability

The vital duties and liabilities of a contractor are ordered by the conditions of contract. Some specific duties and liabilities are mentioned below :

- It is the duty of a contractor to inspect the sit and study soil condition before tendering. He should investigate the accessibility, availability of electric power, water supply condition for construction purposes, and the local law and order condition
- He should collect the local rates of materials and labour and accordingly prepare analysis of rates for all the items in the schedule attached to the tender.
- It is the duty of a contractor to go through the different clauses of the conditions of contract, issue rates of materials, tools and plants if any before submission of tender.

**2.Q. Explain the different kinds of arbitration according to arbitration act 1940. [2015(s) 2-b]**

**Ans:** Different kind of arbitration according to arbitration act 1940 are as follows:

- Except where otherwise provided in the contract, all questions, disputes, meaning, claim arising out or relating to the contract, estimates, specifications, designs, drawoings, quality of workmanship or materials used on the work, instructions, order on those conditions on otherwise concerning the works on the execution or failure to execute the same arising at any state shall be referred to the sole arbitration of the chief engineer of the department.
- If the chief engineer be unwilling to act as such arbitrator he shall appoint a person as an arbitrator and such appointment shall be valid.
- It is also a term or this contract that no person other than a person appointed by the chief engineer shall out as arbitrator.
- The person thus appointed shall be the sole arbitrator and his award shall be final and binding on all parties to the contract, unless it is set aside by the court.



- The contractor invoking arbitration shall specify the disputes to be referred to arbitration together with the amount of claim.

**3.Q. Write down the duties and responsibilities of Junior Engineer [2018 ,6-b]**

**Ans:** Duties of Junior Engineer:

The Junior Engineers are directly in charge of works they are to look after the execution and management of all works in their section and they are required to do all works connecting with stores, accounts and execution of works. They should have sufficient fore-sight and should plan well in advance. They have to stay at the site of the works and supervise the works and to maintain quality and progress of the works. They have to take measurements of works done under their charge and prepare bills or payment. In general the duties of junior engineer may be classified and they are to control the quality of works under three heads.

(i) Works

(ii) Store

(iii) Accounts

- i. Works:** they are to supervise the execution of works on building, canal, road etc. and see the progress of works as they are directly in charge.
- ii. Store:** They are entirely responsibility for all stock and store, tools and plants etc. and maintain the account of stock in up to date correctly. They are go safe guard the stock properly and maintain the articles are properly stacked and stored without any damage.
- iii. Accounts:** Regarding account the Junior Engineer has to maintain correctly with day to day receipt and issue. The imprest cash account has to be maintained regularly and submit the same account to the S.D.O. or Executive Engineer after closer in monthly basis.

